

A PROSPECTIVE STUDY OF TRANSCRIPTION ERRORS ASSOCIATED WITH COMPUTERIZED PRESCRIPTION ORDER ENTRY IN A MULTI-SPECIALTY HEALTH CARE ORGANIZATION

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Summary

Medications errors are reported to be the eight most common causes of deaths in a report of ISMP. Since it is very common at those places where it is reported and documented. The present work was designed to study the transcription errors associated with CPOE (computerized prescription order entry). The computerized prescription order entries by the nursing staff were counter-checked with the original prescription written by the doctors over a period of six months. A total of eighteen thousand prescriptions (three thousand every month) were cross-checked for monitoring any discrepancy between original prescription and the computerized drug order over a period of six months. The results showed an overall 380 prescriptions or 2.11% of the prescriptions was found to have transcription error. The errors were further divided into categories according to the criteria for labelling the computerized drug order entry as a wrong one i.e. a wrong drug, wrong combination, wrong dose and wrong preparation. The wrong combination errors were further subdivided among 4 classes of drugs. It was found that Anti-tubercular drug combinations were found in 44% cases followed by Anti-platelet drug (28%), vitamins combinations (20%), and Anti-hypertensive combinations in 8% cases.

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Introduction

Health care is nearly 10 years behind other industries in its efforts to reduce the errors. Medication error may be nobody's baby, but when it happens, it could well turn out to be everyone's worry. The reasons which are given for medication errors range from silly to the downright serious. According to studies cited in the Institute of Medicine report, *To Err Is Human: Building a Safer Health System*, 44,000 to 98,000 Americans die each year as a result of medical errors³. This statistic is associated with a cost of \$17 to \$29 billion and ranks medical error the eighth-leading cause of death in the United States³. A medication error is defined by the National Coordinating Council for Medication Error Reporting and Prevention (NCC MERP), as "*any preventable event that may cause or lead to inappropriate medication use or patient harm while the medication is in the control of the health care professional, patient, or consumer*"⁴.

In a hospital setup four types of medication errors are commonly reported- Prescription, Transcription, administration, and Dispensing errors. In this computer-age we are dependent upon machines for many daily routine processes. One among these is the ordering of drugs through computer software in tertiary care hospitals. The present study is based on monitoring of computerized prescription orders made by the nursing staff for transcription errors in a setup where the prescribed drugs are ordered using software programmed based online computer indenting facilities and suggests methods to improve medication safety in such a setup.

Material and Methods

The study was a prospective one, done over a period of six months in multi-specialty in New Delhi where the prescription orders written by the consultants are transcribed by the nurses through a Computerized Order Entry (COE) system for the hospital inpatients. The data was collected by doing regular cross-checking of all these online prescription drug order entry made by the nursing staff and matching it with the original prescription written by the consultants. The nurses are ordering the drugs using software which displays the list of all the drugs stored in the pharmacy as per the hospital formulary. All the errors made in the indents (COE) have the potential to cause patient harm to a variable extent. These errors were rectified before dispensing the drugs and were documented in the hospital records as list of intercepted errors along with other details. The criteria for labeling the indent to be wrong one were given as below:

1. Wrong Drug: Drug order containing a different salt other than that prescribed in the prescription order because of confusion in the brand names/proprietary names.
2. Wrong Combination: Drug order containing a different combination or instead of single drug, a combination preparation indented or instead of combination a single drug indented.
3. Wrong Doses: Drug order containing wrong doses of the drugs prescribed.
4. Wrong preparation: Drug order containing preparation of drugs other than what was prescribed by the doctor.

The above criteria was made after monitoring the drug orders for the frequency of occurrence of the errors and more than 5% of the total errors were taken in account.

Results

A total of eighteen thousand prescriptions (three thousand every month) were cross-checked for monitoring any discrepancy between original prescription and the computerized drug order over a period of six months. The results showed an overall 380 prescriptions or 2.11% of the prescriptions was found to have transcription error.

Table1. Total number of errors and percent Transcription errors (errors per 100 prescriptions cross-checked with the original prescription) found in each month.

MONTHS	TOTAL NO. OF ERRORS	% ERRORS
JANUARY	30	1.0
FEBRUARY	54	1.8
MARCH	57	1.9
APRIL	84	2.8
MAY	75	2.5
JUNE	80	2.7

The transcription errors committed by the nurses were rectified by the prescription audit department and right drugs were dispensed in right doses. The errors were further divided into categories according to the criteria for labeling the computerized drug order entry as a wrong one i.e. a wrong drug, wrong combination, wrong dose and wrong preparation.

The details of the percentage of every category of transcription errors are shown in table 2. The highest percentage was of wrong combination 41% followed by wrong preparation 26%, wrong dose 16% and wrong drug 11%.

Table 2. Transcription errors divided into categories and Total percentage out of 380 faulty prescriptions was calculated.

MONTH	WRONG DRUG	WRONG COMBINATION	WRONG PREPARATION	WRONG DOSE
JANUARY	4	15	5	4
FEBRUARY	6	17	11	3
MARCH	5	30	15	7
APRIL	8	33	18	23
MAY	10	28	20	17
JUNE	7	32	30	7
TOTAL PERCENT	11%	41%	26%	16%

The wrong combination errors were further subdivided among the class of drugs involved & shown in Table 3. It was found that Anti-tubercular drug combinations were found in 44% cases followed by Anti-platelet drug (28%), vitamins combinations (20%), and Anti-hypertensive combinations in 8% cases.

Table 3. Wrong combination Transcription errors further divided into subcategories as per the class of drugs with examples.

DRUG CLASS	PERCENT OF TOTAL WRONG COMBINATION ERRORS	COMMON EXAMPLES OF ERRORS
ANTI-TUBERCULAR	44%	Instead of R-cinex only R-cin Indented; Instead of Combunex only Combutol indented etc.
ANTI-PLATELETS	28%	Instead of Clavix AS only Clavix indented. Instead of Deplatt A only Deplatt indented.
VITAMINS	20%	Instead of Becosule-Z; only Becosule indented; Instead of Cobadex-Z or Cobadex Forte only Cobadex indented.
ANTI-HYPERTENSIVES	8%	Instead of Losar-A, only Losar indented or Instead of Numlo AT only S Numlo Indented.

Discussion

The present study showed that Medication error of a large magnitude could occur if a prescription written by the doctor is not transcribed correctly. Here, the transcribers are nurses with a good knowledge background still the mistakes are frequently done. The reasons could be from a silly to downright serious one. The reasons evaluated for these transcription errors are-

1. Busy working hours.
2. Illegible hand writing of the doctor and use of unapproved abbreviations.
3. Lack of brand name knowledge.
4. Lack of double checking system.
5. Confusion in look alike and sound alike drugs.
6. Little computer operating knowledge among nurses.

The nurses are the second responsible person after the doctor. They have to do lot of technical work related to patient treatment and many times needs to answer endless queries of the patient. This makes there job hectic and overresponsible. Secondly, since they have a little knowledge of generic and brand names of the drug, they are prone for making mistakes when look alike sound alike drugs^{3,4} are prescribed. To reduce the errors related to look alike sound alike drug a minimum edit distance or Levenshtein distance (after the name of Great Russian scientist Vladimir Levenshtein) of more than five should be maintained. Levenshtein distance has been used to predict error pairs⁵. An example of how this works is given by comparing Lamictal (lamotrigine) and Lamisil (terbinafine). To transform Lamisil into Lamictal, the S is changed to a C, the I is changed to an A and the T is added. Three edit

operations are required, giving a Levenshtein distance between the two names of three. The lower the distance, the more similar the drug names are⁶. Thirdly, for a computerized drug order, knowledge of computer software used for making the drug order is essential, otherwise typographical errors are common. Many times the prescriptions written by the doctors are in illegible handwriting and difficult to read, also the use of unapproved abbreviations is common among physicians which further increase the errors⁷. Double-checking medications has long been a standard of practice in hospitals and other institutions. Some have moved to make it mandatory to double-check all medications. Others have limited lists of high alert medications which require double-checking. In our hospital only high alert medications are double checked. These usually include medications such as insulin, narcotics and opiates, dobutamine, chemotherapy drugs, injectable potassium, anticoagulants, and NaCl with greater than 0.9 percent concentration⁸.

Although few data from health care are available, bar coding of drugs also seems useful for reducing error rates. The major barrier to implementation has been that drug manufacturers have not been able to agree on a common approach; this should be legislated. Bar coding is widely used in many industries outside medicine; it results in error rates about a sixth of those due to keyboard entry and is less stressful to workers⁹.

In certain studies pharmacist review of medication orders has been shown to prevent errors, and pharmacist consultation has reduced drug costs. The presence of a pharmacist on rounds as a full member of the patient care team in a medical intensive care unit was associated with a substantially lower rate of adverse drug events caused by prescribing

errors¹⁰. Although information technologies are widely used in hospitals, relatively few data are available regarding their impact on the safety of the process of giving drugs. Exceptions are computerised physician order entry¹¹ and computerised physician decision support, which have been found to improve drug safety^{12,13}. The computerised physician order entry (CPOE) is an application in which physicians write orders online. This system has probably had the largest impact of any automated intervention in reducing medication errors; the rate of serious errors fell 55% in one study¹⁴ and the rate of all errors fell 83% in another¹⁵.

Conclusion

Since in most of the multispecialty hospital in India the nursing staff is responsible for placing drug orders through an online computerized system, mistakes are bound to occur because of hectic schedule, high patient load, illegible handwriting of doctors, ill experienced nurses, high turnover of staff and many other things. Therefore a cross checking system or a vigilance activity, would be very beneficial for the hospital in terms of reducing the burden because of medication errors and increasing the rate of patient recovery and discharge from the hospital. This could also be reduced by implementing a system of CPOE (computerized physician order entry)¹¹ and **bar coding**⁹. But still a zero medication error is an impossible thing to achieve because we are humans and not machine. So, the only way to get rid of medication errors is a thorough scrutiny of all the steps involved in medication process starting from the placement of drug order till the administration of the drug to the patient.

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